

and the other resting on the tape. When no signals are being received the pen draws a fine line on the paper, but when a signal arrives it is deflected. The result can be seen from the specimen of tape in Fig 4. There is an arrangement by which the amplitude of the deflection can be controlled by making the syphon come up against a stop. It is obvious that the tops of the humps in the line representing dots and dashes are not needed for reading the message, since it is easy to see from the length of the break in the base line whether the signal is a dot or a dash. The tops of these humps have, however, a special interest. It will be noticed, on examining them closely, that they are not smooth, but are slightly irregular. These irregularities represent the sparks, and it is possible therefore to see from the form of the humps whether the sparking at the transmitting end is good or bad. A particularly bad spark is seen at the beginning of the third signal (the second dot) in the letter *l*, and a careful examination of the dashes more especially, shows quite clearly the nature of the sparking at the transmitting station seven miles off. This not only points to the great sensitiveness of the coherer, but shows that it should prove particularly useful in research, since by its use one can obviously much better investigate the conditions necessary for good signalling. In spite of this delicacy, it is remarkable how easy the coherer is to adjust. A milled head screw allows the mercury to be raised or lowered at will, and it is quite easy to get proper adjustment in a few seconds, even though one starts with the disc either

(b) Does the University of — afford any special facilities for post-graduate study (in particular with regard to applied science) to the graduates of colonial universities? Does the university reward special post-graduate students by bestowing upon them degrees, and on what conditions as to residence or tests of fitness are such degrees bestowed?

(c) Does the University of — possess any special endowments for the encouragement of colonial students; or are colonial students habitually aided by any endowments not under the control of the university?

(d) What is the average number of colonial students studying in the University of —?

The colonial universities (with the exception of the universities of India) had meanwhile been asked to appoint delegates to represent them at the conference, with the result that, when the conference opened, almost every university within the Empire was directly represented.

The actual session occupied one day only, but a good deal of hospitality was exhibited during the week, and whatever view may be held as to the value of the business actually transacted, there can be no question as to the quality of the entertainment provided. The informal meetings between the delegates both before and after the session day, constituted probably the most important part of the conference the opportunity for interchange of ideas was absolutely unparalleled in the history of British education, for not only were the delegates drawn from practically every university within the Empire, but they were, on the whole, exceptionally well qualified for their duties. It is not possible to set down in writing a precise



FIG. 4.—Facsimile of Tape.

in permanent contact or right out of contact with the mercury; in fact, the whole coherer can be dismantled and set up again in a few minutes. This coherer seems to us one of the most promising features of the system; it is a device at once quite simple and thoroughly mechanical, easy to reproduce, and easy to adjust, and, judging by the results which have been obtained, is both sensitive and trustworthy in practical work. So far as one can judge without lengthy experiment, it is more promising than any other form of receiving apparatus yet devised.

We may add that the system has been adopted by the Eastern Extension Telegraph Company on its two new cable ships, and is reported to be giving every satisfaction. In conclusion, we should like to express thanks to Messrs. Muirhead and Co. for showing us the system at work, and for lending the photographs from which the illustrations to this article have been made.

MAURICE SOLOMON.

#### THE ALLIED COLONIAL UNIVERSITIES CONFERENCE.

A STRONG committee—Sir Gilbert Parker being the moving spirit—addressed the following circular letter to the universities of the United Kingdom on May 30:—

In order to facilitate the proceedings at the Allied Colonial Universities Conference, to be held at Burlington House on July 9, I shall be very much obliged if you can assist me with information upon the following points:—

(a) Whether, and if so in what way, the conditions under which degrees are given by the University of — are modified in the case of persons who have studied in or taken the degrees of colonial universities.

estimate of the advantage to be drawn from informal conversations between those who are interested in the same things but have few opportunities of discussing them; the British Association, however, affords a proof, repeated annually, that there is a very important advantage to be gained in this way. Those engaged in carrying on university work in new countries and in communities where the importance of that work is not always properly understood, are apt to wonder now and again whether they are really on the right track, whether their work is, after all, as important as they have been in the habit of thinking it is, and whether their methods are sound and progressive. To such men the stimulus of a conference such as the one just over is invaluable, and the chance of learning at first hand what others are doing is also invaluable.

To come to the conference itself. The chairman, Mr. Bryce, called the meeting to order with commendable punctuality, and explained in a scholarly way—though in the most general terms—how universities might cooperate to their mutual advantage. The Vice-Chancellor of Cambridge then proposed the first resolution:—

"That in the opinion of this conference it is desirable that such relations should be established between the principal teaching universities of the Empire as will secure that special or local advantages for study, and in particular for post-graduate study and research, be made as accessible as possible to students from all parts of the King's dominions."

This was supported with businesslike brevity by various delegates both from the United Kingdom and from Greater Britain, and was finally passed without dissent. From the discussion the following principles finally emerged:—

(1) There must be no thought of attempting uniformity of regulation—each university must decide for itself how it should treat post-graduate students from other universities.

(2) The question at issue was, for practical purposes, to be limited in the first instance to the consideration of post-graduate facilities. In this connection it was shown by Sir Henry Roscoe that the scholarship system of the Commissioners of the 1851 Exhibition had proved itself to be a great success, and Prof. Ewing showed that the Cambridge "research tripos" had also succeeded beyond all expectation.

Cambridge appears to be the only university which, so far, has provided satisfactory machinery for post-graduate students of other universities, and one of the objects of the conference was to induce other universities to show themselves as liberal as Cambridge in this respect.

(3) It appeared that more scholarships on the lines of the Commissioners of the 1851 Exhibition were needed, and could be worthily allotted.

(4) The magnificent hospitality of the University of France and of the universities of Germany at present attract a large number of British students. It was felt that, though this might be regretted on sentimental grounds, the only legitimate manner of dealing with it was to provide within the King's dominions at least as great freedom and facility for study as could be obtained abroad.

It was abundantly clear that the delegates, as a whole, were extremely well informed on educational subjects. For instance, it was practically taken for granted by all the speakers that there can be no serious education which does not embrace a certain amount of research work; the only speaker who did not appear to endorse this view being Prof. Mahaffy, of Dublin, who was witty on the subject in the well-known mid-Victorian manner. Since Germany has given to our disadvantage a definite experimental proof of the success of research as an instrument of education, the delegates probably felt that the matter had gone beyond the range of academic discussion.

It was also interesting to note that the principle of "examination by the teacher" appeared to be fully admitted on all hands.

The afternoon session was devoted to a quite similar discussion on a motion for the appointment of a standing committee. The committee so proposed did not explain in any way what steps it intended to take, nor did any speaker ask it to do so, or make any very distinct suggestion as to its duties, so that future developments must depend entirely on personal initiative within the committee. It would have been better, probably, had the committee been less reticent.

On the whole the conference must be regarded as having met with a quite unanticipated measure of success. There was an enthusiasm and go about it throughout which was most stimulating, and of the best possible augury for the future of English-speaking university education. If secondary education could be brought up to a corresponding standard, we should be much better off than we are.

The proceedings culminated in a huge dinner of about 500 people at the Hotel Cecil on the evening of July 10, with Mr. Balfour in the chair, and at his best in proposing the toast of the evening afterwards.

The conference was excellently managed throughout, and it is fair to say that a good deal of the success attained must be attributed to the exertions of the honorary secretary, Mr. Kinloch Cooke. A conference for which no precedent exists requires, in the words of Lord Palmerston, "a lot of bottle-holding," and Mr. Kinloch Cooke appeared to be equal to all the demands made upon him.

R. T.

#### MR. BALFOUR ON ACADEMIC AND SCIENTIFIC EDUCATION.

We reprint from the *Times* of July 11 the report of the speech made by Mr. Balfour in proposing the toast of the evening, "The Universities of the King's Over-Sea Dominions" at the Allied Colonial Universities dinner on Friday last :

We are here, if I may venture to say so, a remarkable gathering in the individual capacity of the members who compose it. But I think we are still more remarkable taken in connection with the central idea which has brought us together. It is not merely, or simply, or chiefly that there are in this room the representatives of scholarship and science, of all the great spheres of activity in which modern thought is indulging itself. It is that we are here representing what will turn out to be, I believe, a great alliance of the greatest educational instruments in the Empire—an alliance of all the universities that, in an increasing measure, are feeling their responsibilities, not merely for training the youth which is destined to carry on all the traditions of the British Empire, but also to further those great interests of knowledge, scientific research, and culture without which no Empire, however materially magnificent, can really say that it is doing its share in the progress of the world. I think that we who in this room belong to the old country, and who were educated in the older universities of England, of Scotland, or of Ireland, have great reason to be proud of those who may be described as our educational children—I mean the universities of the other portions of the Empire.

We boast of community of blood, of language, of law, of literature; but surely we may also boast, and with not less reason, that the ideals of education which are working a great work in the old country are now doing their work among its younger children, and are carrying on in all the self-governing nations of the Empire work like that which they perform in the parent country. Now, my lords and gentlemen, I have mentioned two subjects already in the few sentences I have uttered which, each separately, has been exercising the minds, at all events, of people on this side of the Atlantic—the ideals of education and the ideals of Empire. We have been quarrelling—it would, perhaps, not be too much to say we are still quarrelling—over both. I ask you to consider them in conjunction, but I hope that the two elements brought into this chemical composition will prove less explosive than they do in their separate and individual character. At all events, I am certain that nothing I shall say will hurt the sentiments even of the most ardent opponents of the Education Act passed through Parliament last year, or will in the smallest degree anticipate that interesting discussion upon tariff reform with which it is promised us that the autumn is to be occupied. I mean to talk of education, and I mean to talk of Empire; but I hope and believe I shall tread upon nobody's toes, and that is partly because I think I am justified in treating very lightly on an occasion like this that part of the great educational problem which touches upon secondary education. I confess that, as far as I am concerned, I have never been able to make a theory satisfactory to myself as to what is or is not the best kind of education to be given in those great public schools which are the glory of our country, and which, in their collective effect upon British character, I think cannot be overrated, but which are subjected, and perhaps rightly subjected, to a great deal of criticism as to that portion of their efforts which is engaged on the scholastic and technical side of education.

I cannot profess myself to be satisfied with the old classical ideal of secondary education; and yet I am not satisfied—perhaps I ought to put it more strongly and say I am still less satisfied—with any substitute I have seen for it. I have heard the old system defended on the ground that the great classical languages contain masterpieces of human imagination which have never been surpassed; and, of course, that is true. But I do not think we can defend classical education in the great public and secondary schools on that ground alone. You have only got, after all, to make a simple statistical calculation, which perhaps we cannot put down in figures, but which every man with

the smallest experience, perhaps with the smallest memory of what he was and what his school fellows were at the age of seventeen or eighteen, can make, to know that the master of the dead languages of a kind which enables them to enjoy those great works with their foot on the hearth, which is the only way to enjoy any work of literature, the number of boys who leave the great public and secondary schools with that amount of knowledge is a very, very small percentage. You cannot keep up a system of education for a very, very small percentage; and, if that is the only defence of classical education, I think it will have to be abandoned except for the few who are qualified to derive all the immense advantages which to the few they are capable of imparting. But when I turn to the other side and ask what the substitute is, then I confess I am even less happy than when I consider the classical ideal; for I am quite sure—no, I am not quite sure, but I think—you will never find science a good medium for conveying education to classes of forty or fifty boys who do not care a farthing about the world they live in except in so far as it concerns the cricket field, or the football field, or the river—you will never make science a good medium of education for those boys; for only a few are capable at that age, and perhaps at any age, of learning all the lessons which science is capable of teaching. I go further. I never have been able to see, so far as I am concerned, how you are going to get that supply of science teachers for secondary schools who have both the time to keep themselves abreast of the ever changing aspects of modern science and to do all the important work which the English schoolmaster has to do, which is that not simply of teaching classes, but of influencing a house and impressing moral and intellectual characteristics on those committed to his charge.

I do not know whether it was Lord Kelvin's presence which inspired me to say something which I was afraid he would not like. I did not mean to deal with this topic at any length. I only meant to say that while, as far as I am concerned, I think we have not yet arrived at the ideal system or the ideal character of our secondary and public school education, I do think that, so far as this assembly is concerned and the universities are concerned, we are on much more solid ground when we come to the education with which they have got to deal; and especially and chiefly do I say that we are on absolutely secure ground when we are dealing with that post-graduate education which, I hope, will be the great practical result, or one of the great practical results, of the meeting which I am addressing to-night. We know exactly what we want when dealing with post-graduate education, and it is our business to see that the students who desire it have it, and that the opportunity of those who do desire it is augmented so far as our influence will go. I daresay that many of us have looked back with a certain regret, and a certain feeling of shame, to the medieval passion for learning without fee and without reward—with no desire to make the universities stepping-stones to good places or to successful mercantile or industrial undertakings—but with an ideal which made thousands of students from every country in Europe undergo hardships which would be regarded in these softer days as absolutely intolerable, for the sole purpose of seeking, and it might be finding, the great secret of knowledge. We despise, and we perhaps rightly despise, their methods. We know that they were not in touch with the actual realities of the world in which they lived. Yet, after all, we have something to learn from them; and if we in these days could imitate their disinterested passion for knowing and for extending the bounds of knowledge, surely we, with our better methods, and our clearer appreciation of what we can know and what we cannot know, might accomplish things as yet undreamed of. Now, what did they do? They moved from university to university, from Oxford to Paris, from Paris to Padua, from country to country, in order that they might sit at the feet of some great master of learning, some great teacher who might lead their thoughts into undreamed of paths. I hope that in the universities of the future every great teacher will attract to himself from other universities students who may catch his spirit—young men who may be guided by him in the paths of scientific fame; men who may come to him from north or from south; and who, whether they come from the narrow bounds of

this island or from the furthest verge of the Empire, may feel that they have always open to them the best that the Empire can afford, and that within the Empire they can find some man of original genius and great teaching gifts who may spread the light of knowledge and further the cause of research.

I have said that they were to find this—I have suggested, at all events, that they should find this—within the limits of the Empire. I hope that in putting it that way I have not spoken any treason against the universality of learning or the cosmopolitan character of science. I quite agree that the discoveries made in one university or by one investigator are at once the common property of the world; and we all rejoice that it is so. No jealous tariffs stand between the free communication of ideas. And surely we may be happy that that is the fact. And yet, though knowledge is cosmopolitan, though science knows no country and is moved by no passion—not even the noblest passion of patriotism—still I do think that in the methods and machinery of imparting knowledge, as there always has been in modern times, so there may still continue to be some national differentiation in the character of our universities, something in our great centres of knowledge which reflects the national character and suits the individual feeling, and that an English-speaking student and a citizen of the Empire, from whatever part of the world he may hail, ought to find something equally suited to him as a student, and more congenial to him as a man, in some university within the ample bounds of the Empire. If that be our ideal, we have to ask ourselves whether we have accomplished it, or whether we are in process of accomplishing it. I am afraid it is too clear that we have not accomplished it. But that we are in process of accomplishing it, and that we can accomplish it—of that I do not entertain the smallest doubt. The movement which has begun with the inter-university meeting, of which this is the culmination, that movement is not destined to finish with this evening's proceedings. It is but the beginning and the seed of far greater things. And I feel confident that, if the representative men whom I see here gathered together from all parts of the world should by good fortune meet a few years hence in this metropolis of the Empire, they will be able to say, and to say with confidence, that the work begun to-night has not been unfruitful; that the machinery for interchanging ideas between our great academic centres has worked admirable good, not merely for the individual student, and not merely for the cause of knowledge, but for the cause of Empire itself. And while learning ought never to be perverted to the cause of faction, or to the cause of separation between the different sections of mankind, yet nevertheless it will be true that this inter-communication of the highest thoughts between the leaders of academic training in every portion of the Empire to which we belong will have furthered not merely sound learning, but sound patriotism. It is in that faith that I have been proud to share, however humbly, the work on which you are engaged. It is this, I think, that will make memorable in academic history the undertaking which my friend, Sir Gilbert Parker, more, perhaps, than any man in this room, has set himself to accomplish; and it is in the cause of education, of learning, of research, of science, and of Empire that I now ask you to fill your glasses and drink to the toast of the universities of the King's over-sea dominions.

#### NOTES.

It is proposed to change the name of the Jenner Institute of Preventive Medicine to the Lister Institute of Preventive Medicine. A memorandum which has been sent by the governing body to the members of the institute states as one reason for the change of name that there is in London a commercial firm trading under the name of "The Jenner Institute for Calf Lymph," with a prior legal claim to the name of Jenner Institute. So great has the inconvenience become on account of the confusion between the two institutes, that the governing body has determined to seek the sanction of their members and of the Board of Trade to change the name of the institute to the Lister